DOCUMENT RESUME

ED 291 794 TM 011 087

AUTHOR Altink, Wieby M. M.
TITLE Selection for Higher Education in Developing Countries--the Use of Tests in Admission for Pre-Entry Science Upgrading Courses in Botswana, Swaziland and Lesotho.
PUB DATE [87]
NOTE 32p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Ability Identification; Achievement Tests; Admission (School); *Admission Criteria; Aptitude Tests; *Developing Nations; Foreign Countries; Higher Education; Mathematics Curriculum; *Predictive Measurement; Predictive Validity; Science Curriculum; *Selective Admission
IDENTIFIERS Botswana; Lesotho; Selection Tools; Swaziland

ABSTRACT

The degree of predictive validity and the relationship with previous learning conditions were studied for measures used in admission procedures for upgrading courses in science and mathematics in Botswana, Lesotho, and Swaziland. School results, achievement tests, aptitude tests, and ability tests were evaluated for students leaving secondary school for courses preparatory to tertiary education. Admissions procedures in developing countries usually aim for maximum predictive validity and fair chances for those who have had insufficient opportunities to develop their potentials. The various measures showed decreasing variation among schools in this order: (1) school results; (2) achievement tests; (3) aptitude tests; and (4) ability tests. Aptitude and ability measures were characterized by lower predictive value. If equal chances for education were to be pursued for various groups of candidates, the psychometric analyses of this study seemed too narrow to solve the selection problem. Multidisciplinary research is an essential approach to studying selection procedures. Data are presented in table form. (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED291794

Selection for Higher education in developing countries - the use of tests in admission for Pre Entry Science upgrading courses in Botswana, Swaziland and Lesotho -

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Wieby M.M. Altink
Free University, Amsterdam

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
WIEBY ALTINK
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Abstract

This paper deals with the problem of how to meet the two aims of selection that are usually claimed to underly the admission procedures for (higher) educational programs in developing countries: (1) maximum predictive validity, and (2) fair chances for students who have had insufficient opportunities to develop their potential abilities. This problem is discussed with respect to the choice of selection instruments (the so-called achievement - ability debate) and examined in the light of data obtained from selections for admission to (post-secondary) upgrading programs in science and mathematics in Botswana, Swaziland and Lesotho which were run during the periode 1981-1985.

More specifically, in the study two questions are investigated for each of four types of measure (school results and achievement, aptitude, and ability tests): (1) the degree of their predictive validity, and (2) their relationship with previous learning conditions. Although the findings seem to support the propositions made, more research is needed to analyse the selection problem properly. In this respect, it is discussed that multidisciplinary research in particular is a fruitful, and even an essential, approach.

TM 011 087

BEST COPY AVAILABLE

Introduction

Selection procedures for educational programs in developing countries are usually based on two requirements: (1) for the program to be effective the success ratio of the participants should be reasonably high, and (2) all students expected to profit from the program should have equal chances to participate regardless of educational or social background, so that sufficient educational opportunities are guaranteed.

However, particularly at higher levels of education, the two aims of selection may be incompatible. Success or failure in higher education often is strongly connected with the students' previous school performance. If the quality of previous education varies widely among students, their school results will be an inadequate indicator of their abilities, which may result in students from "poorer" schools and/or "poorer" socio-economic backgrounds being discriminated (Dore, 1976; Drenth, 1977). On the other hand, quota's and financial restrictions oftentimes preclude the use of procedures by which not only the best candidates are admitted, but also those whose chances of success are smaller. Since it is not possible to maximize both selection goals simultaneously, an optimal procedure must be sought against the background of social, educational, and psychometric considerations (e.g. Drenth, v.d. Flier, and Omari, 1983; Bali, Drenth, v.d. Flier, and Young, 1984).

Selection psychology may contribute to a solution of this double-edged problem by pointing out the various alternatives and the possible effects of certain admission strategies (composition, background, and chance of success of the groups admitted), and by

evaluation research on the predictive procedures applied (e.g. Cronbach and Gleser, 1965; Cronbach, 1984). Below, we will focus on this contribution and discuss some strategies for selecting candidates for admission to (higher) educational programs by which the validity of the selection and the provision of equal chances to all candidates expected to profit from the schooling are best quaranteed. More specifically, we will use data from the selections for Pre-Entry Science (upgrading) programs in Botswana, Swaziland, and Lesotho in order to test some of the assumptions involved in the use of various selection instruments.

First, however, we will give a brief outline of the selection problem focussing on the question of whether to use measures of students' achievements or measures of students' abilities.

Achievement and ability

In selecting candidates for (higher) educational programs, a logical source of information is their previous school performance. Assuming that the learning processes in successive learning programs are closely related, it can be argued that for a student to be able to profit from a subsequent learning experience he/she must possess certain knowledge and skills. This argument is supported by educational research which shows that previous school results constitute a good general predictor of future educational performance (e.g. Ebel, 1979). However, as the knowledge and skills a student acquires depend (at least partially) on the quality of the education provided, school results may to a great extent be a reflection of the quality of previous education. The use of achievement measures in selection may

therefore ential that students from "poorer" schools are less likely to be admitted to the program.

By and large, the above applies also to achievement tests (standardized and objective tests measuring knowledge of specific subjects). However, since many of these tests are primarily intended to predict future school performance, the scores will relate less to the quality of previous education than do, for instance, previous school results which rather reflect the product of specific educational processes.

Measures that do not rely so much on previous learning experiences, such as ability tests, have the advantage that they are not as strongly related to the quality of the students' previous schooling. This advantage is neutralized, however, by the fact that usually this type of measure is not a very good predictor of students' educational achievements in the near future. Ability tests measure concepts that are considered important in predicting educational performance by assuming one or more hypothetical relationships with the criteria. They are thus conceptually further removed from the achievements to be predicted. Besides, one should also take into account that a student with good abilities but a relative deprivation in knowledge must be given the time and the opportunity to allow him/her to profit from any additional education.

The presumed properties of selection instruments can be summarized by ordering them along a hypothetical continuum of skills on which "concrete knowledge" (achievement) and "capacities" (ability) represent the two extremes (Drenth, 1977, 1982). Measures that can be placed towards the "concrete knowledge" extreme tend to meet the selection goal of maximum predictive validity, while measures placed

at the other extreme are more suited to achieving the objective of providing equal chances to all students, irrespective of the quality of their previous education (see Figure 1). Measures of skills in the centre of the achievement-ability continuum meet both aims of selection to some extent: they rely less upon specific learning experiences than do achievement measures, but are more strongly related to previous learning processes than ability measures. "Aptitude" tests represent such measures: they operationalize skills such as "insight", "understanding" and "problem-solving" using concrete problems from specific subject areas (see also Altink, 1987).

Figure 1

The characteristics of selection instruments as presumed above involve a set of assumptions related to the achievement-ability continuum. Whether, and to what extent, they apply to the situation in developing countries, is yet to be tested by empirical research. Such a test may - at least for the Southern African situation - be derived from our findings on the Pre-Entry Science selection in the Boleswa-countries, to be discussed in the remaining part of this paper.

Method

The aim of our study was to obtain more insight into the psychometric properties of various types of instruments used in Pre-Entry Science selections (school results and achievement, aptitude, and ability tests). The research questions and hypotheses refer to the assumptions underlying the achievement-ability continuum: (1) the degree of validity in predicting future educational performance, and

(2) the amount of variation in scores of students from different educational backgrounds. These assumptions are summarized by Figure 1 (pg. xx), and will not be discussed here in more detail (for this information, see Altink, 1987).

The data analysed in the study are from the selection procedures for Pre-Entry Science programs in Botswana, Swaziland and Lesotho, covering the period 1981 - 1985[1]. The programs offered secondary school leavers a six month training course in maths and sciences previous to their entering tertiary education. This extra course was intended to enable a greater number of students to go on to tertiary science education. In addition, the Pre-Entry project intended to compensate for differences in the students backgrounds, particularly for inequalities due to variation in the quality of previous education (for more details, see a.o. Altink and Thijs, 1984; Altink, 1985a).

The Pre Entry courses[2] could accommodate only a limited number of students: some 120-180. Because there were many more candidates than there were places (after a first selection there were approx. 600 - 1000 secondary school students per country) a selection procedure was used to regulate the admission of candidates. In this selection procedure several types of test were administered: achievement, ability and aptitude tests. Student performance on the final exams of the secondary schools, the Cambridge O-level School Certificate for Overseas Countries (COSC), was not used in the selection, because these results were not available until two months after the program started. (The upgrading program starts immediately after completion of secondary education and ends before the start of tertiary education). However, in the present study the students' final school results are also

considered in relation to the Pre-Entry selections. They consist of the COSC-results in English, math., science and biology[3].

In the validity study the end results of the Pre-Entry courses are used as criterion measures. The scores concern mathematics, physics, chemistry, biology and English. Of course, in order to evaluate selection instruments essentially long-term criterion measures should be studied as well. However, as these measures frequently suffer from methodological artifacts - e.g. restrictions associated with small and selective samples, or the interference of (unknown) effects from previous selection practices - or, in some cases, simply are not available, they are not included in this study.

Another restriction of our study is the lack of detailed information about the students' educational and home backgrounds and about the presence of educational facilities at the schools. We conducted some analyses on these issues (see Altink, 1986; Altink and Straatman, 1986) but the available data concern only particular years of Pre-Entry selections and more often than not represent only rather general characteristics of school facilities or student background. In spite of these limitations, we will discuss some of the results. It should be clear, though, that our findings must be interpreted with great caution.

Finally, the relationships between variables were investigated mainly by means of correlation procedures. (Multivariate) analysis of variance was applied for the estimation of variation in students' scores between schools. In the following we will confine ourselves to the main (general) findings of this study.

Results

Variation in students' scores between schools

Research on the variation in students' school results and test scores at (secondary) schools in the Boleswa-countries shows that on achievement measures in particular the variation tends to be quite substantial. The results, summarized in Table 1, indicate that the amount of variation is about 20 - 40%. On the other hand, for ability and aptitude measures the amount of score variation between schools seems to be smaller (about 10 - 20%) or non-significant ($p > .01$).

Table 1

Thus, it appears that the various measures show decreasing variation between schools, as hypothesised on the basis of the achievement-ability continuum, in the following order: school results, achievement tests, aptitude tests and ability tests. With regard to this finding it is important to note that, for each country, differences were observed in the level of score variation between schools. The schools in Swaziland showed the largest variation, while in Botswana and Lesotho the variation between schools was smaller. Comparison of the countries by average performance level (as measured by the COSC) for schools shows that the smaller score variation between schools, and students, in Botswana and Lesotho may be ascribed to the consistently relatively high scores for the former and consistently relatively low score for the latter -so, there is less variance to be accounted for.

Another question is, of course, whether - and to what extent - the mean school scores are connected with educational conditions. We carried out some small-scale research on this, whithout, however, finding as yet any definitive answer to this question. Nevertheless, leaving details aside (for more information see Altink, 1986; Altink and Straatman, 1986), it can be said that resource factors (such as general physical facilities at schools and the pupil/class ratio) and general teacher characteristics (qualification level, experience, etc.) do not seem to be the major determinants of the schools' performance level on the COSC or the Pre Entry selection tests[4]. That is to say, in some instances significant relationships were found between (single)educational conditions and a school's performance level, but mostly these relationships were neither very strong nor very stable. Thus, given the sometimes large variation between schools in achievement measures, the question remains why some schools perform better than others (see also Magagula, 1984).

Relationship between school results and test scores.

The relationship between performance in secondary education and test scores was analysed for two purposes: to obtain information about the strength of the relationship between test scores and measures representing previous learning and, in line with the foregoing, to obtain an indication of the construct validity of test scores. Table 2 gives a profile of the interrelationships obtained from the analysis of the data for the three Boleswa-countries.

Table 2

Studying the coefficients reported in Table 2, it becomes clear that there are differences in the patterns of coefficients computed for the three samples. Nevertheless, some general trends may be observed in the analysis. First, on the average the achievement tests correlate more strongly with scores on school performance level than do the aptitude and ability tests (the correlations for the achievement tests fall mostly within the .50 - .70. range). Second, the aptitude tests appear to cover school performance to a somewhat higher degree than the ability tests (the correlations are ca. .40 and ca. .30 respectively). It appears then, that the different tests measure different skills and capabilities and therefore, can be placed along a continuum describing the factors of achievement and ability (this finding is confirmed by results from factor analyses, Altink, 1987).

In order to determine whether students' scores are in any way connected with background factors such as socio-economic status, support from parents in school(work), motivation and learning habits, a questionnaire survey was conducted in 1984 (see also Altink, 1985b, 1986). Summarizing its findings (Altink, forthcoming) it can be concluded that neither achievement nor aptitude nor ability measures show a strong relationship with such background factors.[5] To some extent this conclusion is to be appreciated, as it suggests that the use of these measures for the purpose of educational selection involves very little or no bias against particular groups of students. In any other respect, however, the question as to why Boleswa students get high or low scores on the various measures still remains unanswered.

Relationship between school results, test scores and results in Pre Entry.

The validity coefficients found for school results and test scores in the prediction of Pre-Entry performance are given in Table 3.

Table 3

The samples being small, it is to any general trends among the validity coefficients that our attention is drawn. The highest validities were found for school results and achievement tests, with the aptitude tests occasionally showing a strong relationship with performance in Pre-Entry as well (validities for these measures are ca. .50, .40 and .30 respectively). Mostly, subject-associated achievement tests and school results best predict performance in the operationalized, and related, subject areas. The aptitude tests exhibit less variation in validity with respect to performance in the various subject areas than the subject-associated measures. However, this difference in pattern of relationships between the two types of measure is not really very substantial. Finally, for the ability tests the validities found were mostly low or non-significant. Maybe, six months of extra training is not enough to allow "the second-chance" students to catch up.

The low predictive value of ability tests is demonstrated also by regression analysis. When one applies a procedure which seeks the "best" prediction of performance, at the same time eliminating the overlap between the parts of criterion variance covered by single predictors (stepwise regression analysis, Kim and Kohout, 1975; Pedhazur, 1982), it can be concluded that ability tests account for only a minor part of the criterion variance. Achievement and aptitude meas-

ures each account for a specific part of criterion variance which in total amounts to about 40 to 60% (multiple correlations, corrected for "shringkage", range from .60 to .80). Compared to other excersises within this field, these predictive values can be considered reasonably "high".

In this context and taking into account considerations concerning the equal chances selection procedures should provide, it is important to analyse the equivalence of prediction systems for different groups. The results obtained for the total sample of candidates do no tell us whether there are differences in correlations, mean scores, etc, whereas the results of any differences could represent an over- or a underprediction for members of particular (minority or majority) groups. Such an analysis is not concerned with influences of possibly discriminating factors in the measures themselves -as discussed above- but rather focuses on the relationship between predictor scores and criterion scores within different groups.

Since group differences can occur in a variety of ways, we confined ourselves to the analysis of differences in validity coefficients and the analysis of differences in slopes and in intercepts of regression lines for single tests. Also, the comparison was made only for Pre-Entry students who had obtained reasonably good results in secondary school (the so-called "high achievers") and Pre-Entry students who had performed less well in secondary school ("low achievers")[6].

This analysis yielded hardly any (statistically significant) differences between the validity coefficients and the slopes of regression lines of the two groups. However, in almost all instances

significant differences ($P<.01$) were found between the intercepts of regression lines. Without exception, the "high achiever"-group obtained higher predicted mean scores on the criterion than the "low achiever"-group. Such findings are frequently reported in the literature (e.g. Linn, 1978), as is the result that wherever differences in validity coefficients and/or slopes of regression are found, the prediction system for the majority group (here, high achievers) slightly overpredicts for members of the minority group (here, low achievers). In the present study the latter occurred only in 5% of all prediction equations analysed (all 5% applying to Botswana samples) and was most often found for the achievement tests.

Summarizing our results, it seems that a student's level of knowledge is an important condition for success in Pre-Entry. Thus, an important consideration in determining the admission strategy for the Pre-Entry course would seem to be: "whether, and if so, to what extent, a lack of concrete knowledge can be compensated by capacities". This adheres particulary to the selection goal of maximum predictive validity, which is derived from the course goal of "returns": to create a better flow of students to tertiary education. There is, however, also the consideration that the course should provide an opportunity for talented students to catch up in their knowlege. This second goal can be formulated in the selection policy as also accepting pupils whose achievement scores are relatively lower. This will not by definition lead to a lower return. The chance of success is indeed lower for these students ($\pm$ 40 % compared to a chance of success of 60 % for students with a higher level of concrete knowledge upon admission to Pre-Entry), but the return on the decision

to accept them depends on the subjective value, or the "utility" (Petersen and Novick, 1976) of the outcomes. Since this naturally applies to the decision to admit students with a higher level of knowledge as well, we may state that determining the admission strategy for a Pre-Entry course is a fairly complex matter.

Discussion

Both the findings reported above and the results of the other analyses indicate that the selection problem reflects a "dilemma": the measures which best predict Pre-Entry performance, i.e. the achievement measures, show the largest variation between students coming from different schools, while measures which in this respect show less variation i.e. the aptitude and especially the ability measures, are characterized by a lower predictive value. Since we could not demonstrate a relationship between the various measures and certain general characteristics of students' educational and home backgrounds, nothing can yet be said about what factors account for the larger or smaller variation in scores or the higher or lower validity of predictor scores. Thus, if equal chances are pursued for various groups of candidates, the study suggests that psychometric analyses as conducted in this research are by themselves too narrow a basis for solving the selection problem.

Other researchers (i.a. Petersen and Novick, 1976; Drenth et al., 1983; Bali et al., 1984), have already remarked that beside psychometric analyses, particulary socio-political and eductional considerations are important to selection problems as analysed in the present study. The relevance of selection procedures depends as much

on their use, or rather on the criterion they are supposed to predict, and on the preferred outcomes they yield in a wider social context, as on their psychometric properties. A purely psychometric and empirical approach may therefore be particularly fallible in those situations where the selection aims are more or less mutually exclusive. A clear definition of the socio-political direction pursued in selection and of the educational policy, including the appropriate pedagogical arguments, are essential to the assessment of the desirability of selection procedures.

Unfortunately, however, up to now such multidisciplinary approaches are seldom applied in the developing countries. In this respect, the utility-paradigm as proposed by Petersen and Novick (1976) may be very fruitful for analysing the desirability of selection processes. Nevertheless, some decision-making model or procedure has to guide this process of integrative evaluation. It should supplement the utility-paradigm by providing guidelines in managing and concretisizing the task of evaluation and decision-making.

Also, more insight is needed in the determinants of school performance in developing countries and the possible effects of educational conditions on the development of students' skills and capabilities. An important restriction of our study is that it lacks an adequate theoretical framework encompassing factors that might inlfuence student performance. Such a framework is not (yet) available for the situation under survey (see also Avalos and Haddad, 1981). It will be clear, however, that in the absence of any definite ideas about what factors or circumstances may enhance or hamper school and test performance, it is difficult to identify possible biases in measures and

selection procedures.

In sum, we would like to stress the relevance of multidisciplinary research to the analysis of selection problems. Without detailed knowledge of the factors influencing student performance, social policy makers and educationalists may find it hard to find the "right" solution to such problems. In addition, studies on selection problems may continue to suffer from a lack of theoretical considerations, and progress may be only very gradual.

Footnotes

1. Due to the situation that the Pre-Entry Science project in Lesotho started only recently, the data for this program apply only to the period 1983-1985.
2. It should be noted that the following information applies to the Pre-Entry project of the years 1981-1985. Recently the organisation of and selection for some of the courses were changed.
3. Scores in science and biology refer to students' mean performance level in these subject areas. These "super-variables" were composed because most secondary schools offer instruction in only some of the COSC-science and -biology subjects. Preservation of the full COSC-subject structure would necessitate subgrouping of students according to the particular subjects followed, which would have resulted in a major reduction of samples for which such scores would be available.
4. Additional findings subscribing this conclusion will be published in 1987/1988.
5. Similar results were found by Drenth et al. (1983) and Bali et al. (1984) for samples in in Tanzania and Kenia.
6. The groups were composed by dividing Pre-Entry students into two groups, containing an approx. equal number of students, on the basis of the overall results on COSC (the COSC-aggregate score). Of course, an independent criterion for subgrouping is preferable, but in our case this was unfortunately not available.

References

Altink, W.M.M. (1985a). Educational measurement and Evaluation in Science, subprogramme Science Pre-Entry project in Botswana, Lesotho and Swaziland, 1982-1985. Amsterdam: Free University.

Altink, W.M.M. (1985b). Students' attitudes towards schooling and schoolwork. Survey of a Boleswa questionnaire. Newsletter Basic Science Projects, Free University, Amsterdam, 10, 13-17.

Altink, W.M.M. (1986). An attempt to identify factors which influence science education in Swaziland. The Swaziland Institute for Educational Research Bulletin, 7, 42-54.

Altink, W.M.M. (1987). The evaluation of selection tests for educational upgrading programmes in Botswana and Swaziland. International Journal of Educational Development, 7 (1), 1-12.

Altink, W.M.M. and Straatman, A.A.M. (1986). Science achievement in Swaziland (1980-1982) in relation to some schooling conditions. Boleswa educational research Journal, 4, 31-50.

Altink, W.M.M. and Thijs, G.D. (1984). The issue of equity. Research on selection processes for educational programmes in developing countries. Institute for Development studies (Sussex) Bulletin, 15, 74-90.

Avalos, B. and Haddad, W. (1981). A Review of Teacher Effectiveness Research in Africa, India, Latin America, Middle East, Malasia, Philipinnes, and Thailand: synthesis of results. International Development Research Centre, Ottawa.

Bali, S.K., Drenth, P.J.D., Flier, H. van der and Young, W.C.E. (1984). Contribution of Aptitude Tests to the Prediction of School Performance in Kenya: a longitudinal study. Swets & Zeitlinger, Lisse.

Cronbach, L.J. (1984). Essentials of Psychological Testing. Harper & Row, New York.

Cronbach, L.J. and Gleser, G.C. (1965). Psychological Tests and Personnel Decisions. University of Illinois Press, Urbana.

Dore, R. (1976), The Diploma Disease. Allen & Unwin, London.

Drenth, P.J.D. (1977). Prediction of school performance in developing countries: school grades or psychological tests? Journal of Cross-cultural Psychology, 49-70.

Drenth, P.J.D. (1981). Selection in education in Southern Africa. In: Science Education in Southern Africa (edited by Thijs, G.D.) National University of Lesotho, Maseru.

Drenth, P.J.D., Flier, H. van der and Omari, I.M. (1983). Educational selection in Tanzania. Evaluation in Education 7 (2).

Ebel, R.L. (1979). Essentials of Educational Measurement. Prentice-Hall, Englewood Cliffs, New Jersey.

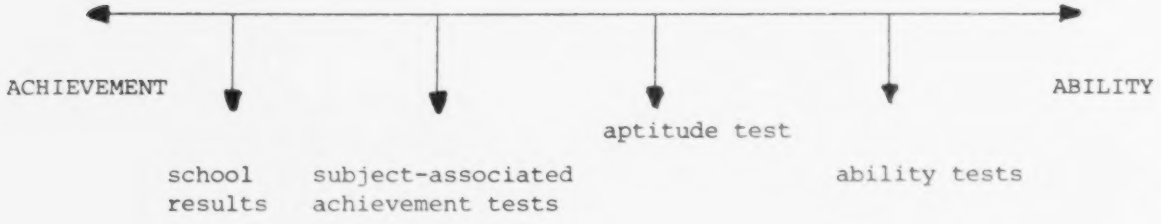
Kim. J.O. and Kohout, F.J. (1975). Multiple regression analysis. In: Statistical Package for the Social Sciences (edited by Nie, N.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K. and Bent, D.H.) McGraw Hill, New York.

Linn, R.L. (1978). Single-Group Validity, differential validity and differential prediction. Journal of Applied Psychology, 63 (4), 507-512.

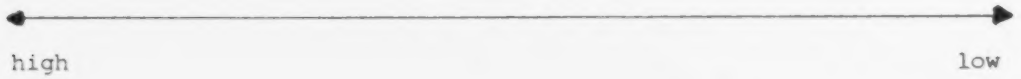
Pedhazur, E.J. (1982). Multiple regression in behavioral research. New York, C.B.S. College publishing.

Petersen, N.S. and Novick, M.R. (1976). Evaluation of some models for culture fair selection. Journal of Educational Measurement, 13, 3-29.

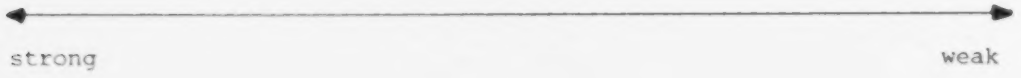
Figure 1: Schematic representation of the achievement - ability continuum*.



Assumption 1: degree of predictive validity with respect to future education



Assumption 2: relationship with possibly discriminating factors arising from pupils' educational background



* The positions of measures on the continuum should be interpreted not according to the distance between them, but rather according to their order.

Table 1: Variation in school results and test scores of schools in the Boleswa countries (expressed in the percentage of score variance).

	Botswana						Swaziland						Lesotho	
	1981	1982	1983	1984	1985		1981	1982	1983	1984	1985			1984
-School results						-School results						-School results		
English	17	16	·22	30	18	English	40	36	37	36	38	English		26
Math.	17	45	22	19	12	Math.	31	31	29	32	34	Math.		28
Science	12	20	13	11	10	Science	32	33	31	36	38	Science		28
Biology	21	20	19	16	12	Biology	38	34	28	42	58	Biology		27
-Achievement tests						-Achievement tests						-Achievement test		
Math.	25	10	17	08	15	Math.	27	31	31	30	25	Math.		33
Science	14	10	+	10	11							Science		32
-Aptitude tests						-Aptitude tests								
Sc. Apt.	-	-	-	+	09	Sc. Apt.	-	-	23	24	22			
-Ability tests						-Ability tests						-Ability tests		
Symb. Ex.	+	16	+	+	06	Symb. Ex.	13	18	14	18	-	Symb. Ex.		18
Spat. Or.	-	-	-	+	08	Spat. Or.	-	-	-	14	19	Spat. Or.		15
Hid. Fig.	14	+	08	-	-	Word. An.	09	20	22	-	-			
						Word. Ex.	22	19	23	-	-			
						Numb. Ser.	08	17	14	-	-			
						Arith.	16	26	23	-	-			

N schools : Botswana 17, Swaziland 30-37, Lesotho 64.
N students: schoolresults: Botswana ± 1000, Swaziland ± 1400, Lesotho ± 1100.
N students: testscores: Botswana ± 600, Swaziland ± 1500, Lesotho ± 110

+ p > .01

Table 2: Correlation between school results and test scores:
mean percentage of common variance (A) and range of correlation coefficients (B).

BOTSWANA*	1	2	3	4	5	6	7	8	9
	B	A B	A B	A B	A B	A B	A B	A B	A B
-School results									
1. English	-								
2. Math.	12 .28/.39	-							
3. Science	13 .28/.42	38 .48/.70	-						
4. Biology	13 .31/.45	20 .40/.47	47 .64/.78	-					
-Achievement tests									
5. Math.	04 .08/.24	52 .68/.78	20 .39/.51	13 .30/.44	-				
6. Science	11 .31/.38	26 .40/.62	29 .37/.61	24 .34/.58	23 .42/.58	-			
-Aptitude tests									
7.Sc.Apt.	07 .07/.36	24 .27/.58	14 .30/.41	13 .20/.46	19 .13/.51	24 .41/.58	-		
-Ability tests									
8. Symb. Ex.	04 .16/.23	14 .33/.43	03 .14/.22	04 .04/.24	13 .27/.42	04 .11/.24	06 .05/.39	-	
9. Spat. Or.	03 .15/.21	10 .25/.36	04 .15/.23	08 .26/.31	07 .19/.31	09 .29/.31	09 .20/.45	12 .33/.35	
10. Hid. Fig.	04 .14/.24	09 .21/.39	03 .08/.28	05 .14/.31	08 .22/.35	06 .21/.32	14 .33/.42	04 .19	06 .25

* Samples of coefficients 1-6, 9 : 1981-1985
7, 8 : 1983-1985
10 : 1981-1983

N-students schoolresults: ± 1000
N-students test scores : ± 600

Table 2 (continued)

SWAZILAND*	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	9 A	9 B	10 A	10 B	11 A	11 B
-School results																						
1. English	-																					
2. Math.	25	.45/.54	-																			
3. Science	26	.44/.55	47	.63/.73	-																	
4. Biology	27	.43/.58	37	.54/.66	61	.73/.80	-															
-Achievement tests																						
5. Math.	17	.38/.44	62	.78/.82	28	.47/.61	28	.46/.61	-													
-Aptitude tests																						
6. Sc. Apt.	20	.43/.47	39	.56/.67	24	.45/.53	22	.39/.52	33	.53/.61	-											
-Ability tests																						
7. Symb. Ex.	11	.28/.28	18	.41/.45	07	.19/.32	11	.22/.41	15	.36/.42	21	.46/.46	-									
8. Spat. Or.	06	.25/.25	16	.40/.41	07	.23/.32	06	.21/.27	12	.30/.38	27	.51/.52	20	.45	-							
9. Word An.	27	.50/.53	21	.45/.46	13	.26/.41	19	.39/.47	17	.40/.43	28	.53	22	.43/.49	-	-	-					
10. Word Ex.	29	.50/.57	20	.43/.46	17	.36/.48	18	.40/.44	15	.35/.43	25	.50	14	.33/.40	-	-	25	.48/.54	-			
11. Numb Ser.	08	.26/.29	17	.41/.42	07	.26/.28	09	.30/.32	16	.36/.43	18	.43	20	.42/.47	-	-	15	.38/.40	10	.32/.33	-	
12. Arith.	17	.37/.43	32	.31/.61	12	.30/.38	17	.34/.44	26	.47/.55	23	.48	23	.46/.50	-	-	15	.36/.43	14	.34/.40	18	.41/.45

* Samples of coefficients 1-5 : 1981 - 1985
6 : 1983 - 1985
7 : 1981 - 1984
8 : 1984 - 1985
10-12 : 1981 - 1983

N students schoolresults : ± 1400

Table 2 (continued)

LESOTHO*	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B
-School results																
1. English	-															
2. Math.	12	.23/.43	-													
3. Science	19	.35/.51	37	.55/.66	-											
4. Biology	26	.49/.53	24	.40/.57	53	.72/.74	-									
-Achievement tests																
5. Math.	14	.29/.44	39	.57/.67	23	.38/.56	19	.38/.53	-							
6. Science	21	.41/.51	28	.44/.60	22	.44/.49	24	.46/.51	32	.34/.72						
-Aptitude tests																
7. Sc. Apt.	06	.25	05	.23	06	.25	07	.27	10	.31	42	.65	-			
-Ability tests																
8. Symb. Ex.	06	.25	13	.36	10	.31	12	.34	23	.48	16	.40	-	-	-	
9. Spat. Or.	03	.01/.25	05	-.02/.30	03	.05/.22	04	.05/.27	08	-.03/.40	19	.30/.53	10	.31	05	.22

* Samples of coefficients,
1-4, 9 : 1983 - 1984
5-6 : 1983 - 1985
7 : 1983
8 : 1984

N students 1983, 1985: ± 120 (Pre Entry Science students)
N students 1984 : ± 1100

Table 3: Correlation between school results, test scores and Pre-Entry results: average percentage of common variance (A) and range of correlation coefficients (B).

BOTSWANA	English		Math.		Pre-Entry results: Physics		Chemistry		Biology		Overall mean	
	A	B	A	B	A	B	A	B	A	B	A	B
-School-results												
1. English	35	.49/.67	00	-.24/.22	03	-.22/.32	03	-.10/.25	11	.18/.42	07	.01/.37
2. Math.	08	.15/.34	32	.46/.55	23	.34/.68	19	.31/.48	11	.23/.42	28	.48/.66
3. Science	15	.30/.57	15	.20/.52	24	.33/.67	26	.32/.63	21	.31/.67	26	.34/.60
4. Biology	21	.37/.54	09	.09/.43	15	.10/.52	16	.21/.49	26	.41/.63	23	.31/.59
Aggregate	33	.46/.65	16	.14/.53	22	.18/.64	19	.28/.54	32	.43/.67	32	.42/.65
-Achievement tests												
5. Math.	02	.04/.24	26	.40/.57	15	.25/.62	10	.16/.48	05	.01/.36	16	.29/.56
6. Science	11	.25/.37	07	.03/.40	21	.26/.63	18	.21/.48	14	.21/.45	19	.22/.55
-Aptitude tests												
7.Sc.Apt.	12	.33/.36	10	.29/.37	25	.30/.58	25	.09/.50	30	.29/.47	21	.30/.56
-Ability tests												
8. Symb. Ex.	02	-.03/.21	02	.02/.24	03	-.13/.33	01	-.07/.18	03	-.05/.30	03	-.05/.29
9. Spat. Or.	02	-.05/.23	02	.03/.23	06	.16/.31	02	.08/.16	04	.12/.24	04	.18/.24
10. Hid. Fig.	04	.07/.30	01	.02/.10	01	-.03/.14	00	.01/.11	01	-.03/.16	01	-.02/.16

N students: ca.: 150

Table 3 (continued)

SWAZILAND	Pre-Entry Results											
	English		Math.		Physics		Chemistry		Biology		Overall mean	
	A	B	A	B	A	B	A	B	A	B	A	B
-School results												
1. English	24	.19/.65	01	-.17/.22	01	-.07/.21	02	-.03/.26	05	.11/.36	06	.11/.32
2. Math.	02	.03/.23	40	.60/.69	28	.38/.73	18	.29/.56	03	.04/.25	26	.36/.62
3. Science	08	.13/.44	16	.28/.53	17	.30/.54	12	.28/.42	07	.11/.43	20	.30/.60
4. Biology	15	.09/.51	08	.11/.38	12	.06/.50	16	.14/.55	31	.43/.62	22	.14/.63
Aggregate	22	.28/.56	10	.12/.42	12	.18/.47	12	.24/.46	19	.35/.61	24	.41/.50
-Achievement tests												
5. Math.	02	-.21/.19	48	.60/.74	34	.16/.73	24	.06/.65	09	-.24/.42	32	.10/.69
-Aptitude tests												
6. Sc. Apt.	07	.19/.35	16	.27/.56	24	.38/.62	14	.23/.54	06	.07/.41	19	.34/.59
-Ability tests												
7. Symb. Ex.	02	-.11/.28	01	-.02/.15	02	.05/.20	02	-.11/.24	00	-.30/.18	02	-.11/.25
8. Spat. Or.	05	-.09/.41	06	-.02/.33	13	.14/.50	06	.03/.40	04	-.10/.35	08	-.01/.47
9. Word An.	08	.07/.42	02	.00/.17	03	.13/.26	04	.11/.28	03	.02/.26	06	.10/.36
10. Word Ex.	05	.12/.35	02	.02/.20	03	.07/.28	04	.08/.25	03	-.07/.26	07	.09/.33
11. Numb. Ser.	01	.02/.12	04	.10/.22	04	.11/.24	06	.18/.32	01	.09/.14	05	.18/.26
12. Arith.	02	.10/.17	11	.21/.45	07	.10/.36	06	.10/.37	03	-.05/.32	09	.13/.42

N students: ca. 130

Table 3 (continued)

LESOTHO	Pre-Entry Results											
	English		Math.		Physics		Chemistry		Biology		Overall mean	
	A	B	A	B	A	B	A	B	A	B	A	B
-School results												
1. English	49	.68/.72	06	.15/.30	08	.22/.32	11	.17/.44	22	.31/.58	23	.37/.56
2. Math.	05	.11/.30	37	.59/.62	16	.40/.41	16	.38/.43	06	.20/.29	21	.44/.47
3. Science	09	.29/.31	06	.21/.29	14	.29/.40	20	.40/.48	18	.41/.44	19	.42/.46
4. Biology	13	.29/.43	08	.15/.37	11	.32/.33	14	.37/.38	25	.43/.56	19	.43/.45
Aggregate	29	.52/.56	10	.23/.38	08	.21/.33	14	.26/.45	21	.42/.49	29	.37/.52
-Achievement tests												
5. Math.	03	.12/.20	20	.27/.62	09	.21/.37	08	.09/.44	03	.07/.24	11	.21/.46
6. Science	05	.17/.26	01	.04/.09	08	.09/.36	10	.09/.40	10	.08/.41	12	.12/.35
-Aptitude tests												
7.Sc.Apt.	21	.46	14	.37	25	.50	18	.42	12	.34	26	.51
-Ability tests												
8. Symb. Ex.	02	.10/.16	01	.07/.12	00	.05/.08	00	.02/.06	01	.01/.14	00	.04/.09
9. Spat. Or.	01	-.10/.02	00	-.20/.04	01	.03/.13	00	-.05/.02	00	-.03/.07	00	-.05/.06

N students : ca. 120.